

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 11, 12, 14, 17, 18, and 25-31 are currently pending. Claims 1, 3-9, 13, 15, 16, and 20-24 have been canceled without prejudice; and Claims 11, 12, 14, 17, 18, and 26-28 have been amended; and Claims 29-31 have been added by the present amendment. The changes and additions to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Claims 9-18 were rejected under 35 U.S.C. § 112, second paragraph, regarding a question of antecedent basis; Claims 1, 3-9, 11, and 13-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,751,196 to Hulyalkar et al. (hereinafter “the ‘196 patent”) in view of U.S. Patent Application Publication No. 2003/0078010 to Davis (hereinafter “the ‘010 application”); and Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the ‘196 patent and the ‘010 application, further in view of U.S. Patent No. 6,904,290 to Palenius (hereinafter “the ‘290 patent”).

Applicants respectfully submit that the rejection of Claim 9 under 35 U.S.C. § 112, second paragraph, is rendered moot by the present cancellation of Claim 9.

New Claim 29 is directed to a multi-hop communication system configured by a radio control station and a plurality of radio stations, wherein, one radio station included in the plurality of the radio stations comprises: (1) a control signal reception unit configured to receive a control signal for communication connection with the radio control station from the radio control station; (2) a reception level measuring unit configured to measure a reception level of the control signal at the one radio station; (3) a relay controlling unit configured to receive a relay control signal to which a reception level of the control signal at an other radio

station is added; and (4) an information signal transmission/reception unit configured to relay an information signal, which is different from the control signal, to an other radio station according to a route in which the relay control signal is relayed, wherein, (a) when the reception level added to the relay control signal is smaller than the reception level at the one radio station, the relay controlling unit adds the reception level at the one radio station to the received relay control signal, and relays the relay control signal, to which the reception level at the one radio station is added, to other neighboring radio stations; (b) a radio station which can transmit the information signal to the radio control station directly, among the plurality of the radio stations, transmits a response relay control signal notifying the route in which the relay control signal is relayed, in response to receiving the relay control signal; and (c) a transmission radio station which is a source of the information signal, transmits the information signal according to the route notified by the response relay control signal.

Applicants respectfully submit that the rejection of Claim 1 is rendered moot by the present cancellation to that claim. However, regarding new Claim 29, Applicants will address the rejections set forth in the Office Action regarding Claim 1. In this regard, Applicants note that the Office Action asserts that the '196 patent discloses everything in Claim 1 with the exception of the control signal having a lower bit rate than an information signal, and relies on the '010 application to remedy that deficiency.¹

The '196 patent is directed to a wireless communication system including a plurality of wireless communication stations associated with the network, wherein one of the wireless stations is designated as a central control station and each wireless station comprises a transmitter and a receiver. As shown in Figure 2A, the '196 patent discloses a peer-to-peer network in which the station designated as the centralized controller communicates with every other terminal over a wireless control plane, while each station communicates with

¹ See page 5 of the outstanding Office Action.

each other station over a wireless user plane. Further, the '196 patent discloses that a quality assessment is made regarding communication between two stations, which may be made on either the wireless control plane or the wireless user plane, and that various quality assessments can be used.² In particular, the '196 patent discloses that a signal-to-noise ratio or a signal strength measurement may be used as the quality assessment. The '196 patent also discloses that an estimate of the likelihood of an erroneous bit value being received can also be used as a quality assessment. Further, the '196 patent discloses that each station will maintain a local database of the quality assessments for communication with other stations, and that the central controller will maintain a global database of quality assessments. See Figure 5, which is an example of the quality matrix between various nodes in the network.

The '196 patent also discloses that relay paths may be instituted between stations based on the measured quality levels and various other factors, and that various algorithms are used to decide whether a relay path should be established, and which relay path should be established.³

However, Applicants respectfully submit that the '196 patent fails to disclose a relay controlling unit configured to receive a relay control signal to which a reception level of the control signal at an other radio station is added, as recited in Claim 29. In addition, the '196 patent does not teach or suggest that when the reception level added to the relay control signal is smaller than the reception level at the one radio station, the relay controlling unit adds the reception level at the one radio station to the received relay control signal, and relays the relay control signal, to which the reception level at the one radio station is added, to other neighboring radio stations, as required by new Claim 29.

² See '196 patent, column 4, lines 20-40.

³ See '196 patent, column 7, line 22 through column 8, line 19.

The '010 application is directed to a method of assigning transmission data rates in a multi-channel communication system based upon a comparison between projected transmitter power output for transmission at a selected data rate, and the maximum transmitter power capability.

However, Applicants respectfully submit that the '010 application fails to disclose a relay controlling unit configured to receive a relay control signal to which a reception level of the control signal at an other radio station is added, as recited in new Claim 29. Further, the '010 patent fails to disclose that when the reception level added to the relay control signal is smaller than the reception level at the one radio station, the relay controlling unit adds the reception level at the one radio station to the received relay control signal, and relays the relay control signal, to which the reception level at the one radio station is added, to other neighboring radio stations, as recited in new Claim 29.

Thus, no matter how the teachings of the '196 patent and the '010 application are combined, the combination does not teach or suggest a relay controlling unit configured to receive a relay control signal to which a reception level of the control signal at an other radio station is added, as recited in new Claim 29. Further, the combination does not teach or suggest that when the reception level added to the relay control signal is smaller than the reception level at the one radio station, the relay controlling unit adds the reception level at the one radio station to the received relay control signal, and relays the relay control signal, to which the reception level at the one radio station is added, to other neighboring radio stations, as recited in new Claim 29. Accordingly, Applicants respectfully submit that new Claim 29 patentably defines over any proper combination of the '196 patent and the '010 application.

New Claim 30 is directed to a radio station that includes limitations similar to those recited in new Claim 29. Further, new Claim 31 is directed to a multi-hop communication method for a radio control station and a plurality of radio stations, and recites limitations

analogous to those recited in new Claim 29. For the reasons stated above, Applicants respectfully submit that new Claims 30 and 31 (and all similarly rejected dependent claims) patentably define over any proper combination of the cited references.

Regarding the rejection of Claim 12 under 35 U.S.C. § 103(a), Applicants respectfully submit that the '290 patent fails to remedy the deficiencies of the '196 patent and the '010 application, as discussed above. Accordingly, Applicants respectfully submit that the rejection of Claim 12 is rendered moot.

Claim 27, which depends from Claim 14, clarifies that the communication route selector is configured to determine the communication route for the information signal by selecting a radio station having a smallest relative transmission power. Applicants respectfully submit that this limitation is not disclosed by the '196 patent. In this regard, the Office Action on page 11 cites to various passages in columns 2-6 in the '196 patent. However, these sections merely disclose the use of a quality assessment to determine relay stations and to determine which station should be the central controller. The '196 patent discloses that quality assessment can be based upon various measurements, such as a signal-to-noise measurement or signal strength. However, the '196 patent does not disclose that the communication route is determined by selecting a radio station having a smallest relative transmission power, as required by Claim 27. For this additional reason, Applicants respectfully traverse the rejection of Claim 27.

Claim 28, which depends from Claim 14, clarifies that the communication route selector is configured to determine the communication route for the information signal to maximize a signal-to-interference ratio while minimizing a number of hops in the communication route. Applicants note that the Office Action relies on the '010 application, specifically paragraphs [0049] and [0050], as disclosing this limitation. However, Applicants note that paragraphs [0049] and [0050] in the '010 application relate to a periodic review

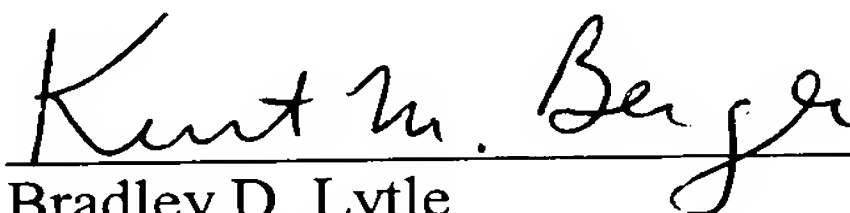
mode that allows the mobile to reassess its power availability and to increase or decrease the data rate accordingly. These passages in the '010 application have nothing to do with generating a communication route in a multi-hop system and have nothing to do with minimizing the number of hops while maximizing the signal-to-interference ratio. Accordingly, Applicants respectfully traverse the rejection of Claim 28.

Thus, it is respectfully submitted that independent Claims 29-31 (and all associated dependent claims) patentably define over any proper combination of the '196 patent, the '010 application, and the '290 patent.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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